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Albert-Ludwigs-Universität Freiburg

QE

Quantum Efficiency Seminar und Colloquium

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Metal Oxide Carbon Nanotube Composites for Electronic Devices

In the recent years, the development of several low cost preparation techniques such as colloidal synthesis led to a boost of new technological developments on the nanometer scale. The field of nanoelectronics, where the wires or contacts have the dimension of few nanometers, expands rapidly due to the possibility of the nanomaterial combination. The advantage of so called composites is the synergetic effects deriving from different nanomaterials, which were combined.

The non-covalent attachment of semiconducting metal oxide nanoparticles (MeO-NP) to untreated carbon nanotubes (CNTs) can be performed using wet chemistry methods. This methodology yields uniformly covered composite materials. It allows synthesis of individual MeO-NP-CNT in suspensions as well as of completely covered three-dimensional NP-CNT-arrays. Due to quantum confinement, semiconductor nanoparticles can act as tunable light absorbers while CNTs are considered as supporting material for quantum dots and charge transport medium since the CNTs reveal mechanical stability, chemical inertness and provide ballistic transport. Assuming close interaction of the CNT π-system with the individual particle, a gapless interface for charge transfer is created.

Thelight absorbing and charge conducting properties of described composites are considered advantageous for sensing as well as photovoltaic applications. Therefore, a field-effect transistor as well as a hybrid solar cell based on MeO-CNTs will be discussed. The integration of composite materials into different electrical devices demonstrates the potential of application-oriented material design on the nanometer scale.

Date: **Tuesday, June 5th, 2012 14:15 pm**
Location: **Lecture Hall 1, Hermann-Herder-Str. 3, Freiburg**

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